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May 18, 2006

Attn: The Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent No.: 6,992,202 B1
Issued: January 31, 2006
Title: SINGLE-SOURCE PRECURSORS FOR TERNARY
CHALCOPYRITE MATERIALS, AND METHODS OF
MAKING AND USING THE SAME
Inventors: Kulbinder K. Banger et al.
Our Docket No.: 35089US1

Sir:

A Certificate of Correction under 35 U.S.C. 254 is hereby requested to correct Patent Office printing errors in the above-identified patent. Enclosed herewith is a proposed Certificate of Correction (Form No. PTO-1050) and documentation in support of the proposed corrections for consideration.

It is requested that the Certificate of Correction be completed and mailed at an early date to the undersigned attorney of record.

Respectfully submitted,

By John P. Murtaugh
John P. Murtaugh, Reg. No. 34226

Certificate
MAY 24 2006
of Correction

JPM/ck
Enclosures: Form PTO/SB/44

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

John P. Murtaugh

Name of Attorney for Applicant(s)

May 19, 2006 John P. Murtaugh
Date Signature of Attorney

MAY 25 2006

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,992,202 B1
DATED : January 31, 2006
INVENTOR(S) : Kulbinder K. Banger et al.

PAGE 1 OF 2

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claim 1

Line 21, after "Cu(S(i-C₄H₉))" and before "2", please insert --)--.

Line 21, after "In(S(i-C₄H₉))" and before "2", please insert --)--.

Line 22, after "Cu(Se(i-C₄H₉))" and before "2", please insert --)--.

Line 22, after "In(Se(i-C₄H₉))" and before "2", please insert --)--.

Claim 22

Line 17, please delete "soup" and insert therefor --group--.

Claim 35

Line 5, please delete "(S: Se)" and insert therefor --(S:Se)--.

Claim 36

Line 8, please delete "alky" and insert therefor --alkyl--.

Line 11, after "Cu" and before "(", please delete the space.

Line 12, after "Cu" and before "(", please delete the space.

Line 13, after "Cu" and before "(", please delete the space.

Line 14, after "Cu" and before "(", please delete the space.

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PATENT NO. 6,992,202 B1

No. of additional copies
⇒ 0

MAY 25 2006

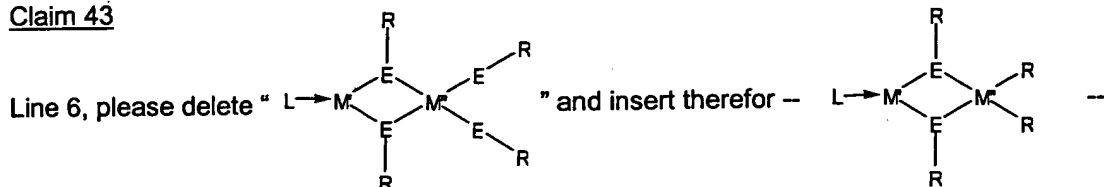
UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,992,202 B1
DATED : January 31, 2006
INVENTOR(S) : Kulbinder K. Banger et al.

PAGE 2 OF 2

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claim 43



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PATENT NO. 6,992,202 B1

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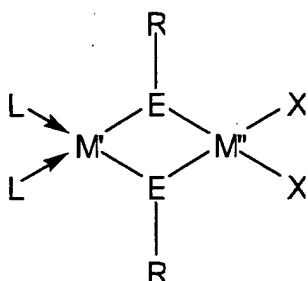
Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

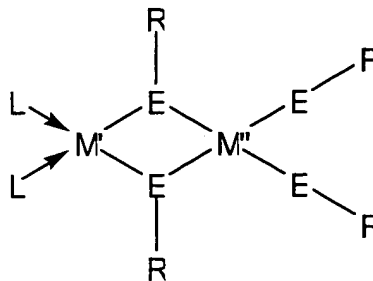
Listing of Claims:

1. (canceled)

New Claim 1
 2. (currently amended) A single source precursor ~~according to claim 1, for the deposition of ternary chalcopyrite materials,~~ said single source precursor having a structural formula selected from the group consisting of



and



wherein L is a Lewis base that is coordinated to M' via a dative bond, M' is a Group I-B atom, M'' is a Group III-A atom, E is a Group VI-A atom, X is a Group VII-A atom, and each R is individually selected from the group consisting of alkyl, aryl, vinyl, perfluoro alkyl, perfluoro aryl, silane, and carbamate groups, said single source precursor excluding

- [{P(C₆H₅)₃}₂Cu(S-C₂H₅)₂In(S-C₂H₅)₂],
- [{P(C₆H₅)₃}₂Cu(Se-C₂H₅)₂In(Se-C₂H₅)₂],
- [{P(C₆H₅)₃}₂Cu(S(*i*-C₄H₉))₂In(S(*i*-C₄H₉))₂],
- [{P(C₆H₅)₃}₂Cu(Se(*i*-C₄H₉))₂In(Se(*i*-C₄H₉))₂],
- [{P(C₆H₅)₃}₂Ag(Cl)(SC{O}CH₃)₂In(SC{O}CH₃)₂],
- [{P(C₆H₅)₃}₂Ag(Cl)(SC{O}C₆H₅)₂In(SC{O}C₆H₅)₂],
- [{P(C₆H₅)₃}₂Ag(SC{O}CH₃)₂In(SC{O}CH₃)₂],
- [{P(C₆H₅)₃}₂Ag(SC{O}C₆H₅)₂In(SC{O}C₆H₅)₂],
- [{P(C₆H₅)₃}₂Cu(SC{O}C₆H₅)₂In(SC{O}C₆H₅)₂],
- [{P(C₆H₅)₃}₂Cu(SC{O}C₆H₅)₂Ga(SC{O}C₆H₅)₂],
- [{P(C₆H₅)₃}₂Ag(SC{O}C₆H₅)₂Ga(SC{O}C₆H₅)₂], and
- [{P(C₆H₅)₃}₂Ag(SC{O}CH₃)₂Ga(SC{O}CH₃)₂].

18. (original) A single source precursor according to claim 16, said single source precursor being effective to yield a ternary chalcopryrite material having a band gap of about 1.5 eV between a conduction band and a valence band thereof. ✓

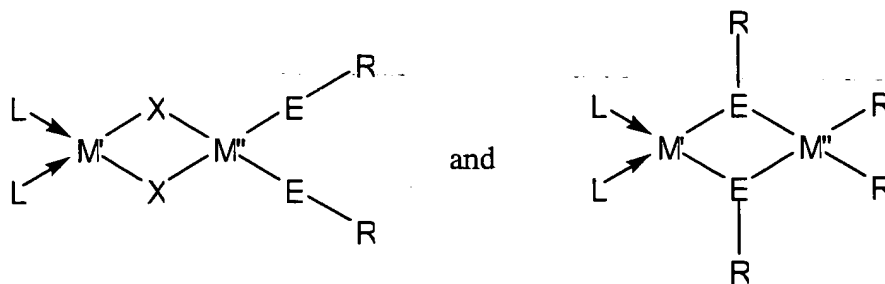
19. (original) A single source precursor according to claim 18, said ternary chalcopryrite material being CuInS₂. ✓

20. (original) A single source precursor according to claim 16, said single source precursor being effective to yield a ternary chalcopryrite material having a band gap of about 2 eV between a conduction band and a valence band thereof. ✓

21. (original) A single source precursor according to claim 20, said ternary chalcopryrite material being CuGaS₂. ✓

22. (original) A single source precursor according to claim 16, said single source precursor being effective to yield a ternary chalcopryrite material having a band gap of 1.5-2 eV between a conduction band and a valence band thereof, said ternary chalcopryrite material being Cu(In:Ga)(S:Se)₂. ✓

new
Claim
22
23. (currently amended) A single source precursor ~~according to claim 1, for the~~
deposition of ternary chalcopryrite materials, said single source precursor having a structural formula selected from the group consisting of



wherein L is a Lewis base that is coordinated to M' via a dative bond, M' is a Group I-B atom, M'' is a Group III-A atom, E is a Group VI-A atom, X is a Group VII-A atom, and each R is individually selected from the ~~group~~ ^{group} consisting of alkyl, aryl, vinyl, perfluoro alkyl, perfluoro aryl, silane, and carbamate groups. ✓

wherein L is a Lewis base that is coordinated to M' via a dative bond, M' is a Group I-B atom, M'' is a Group III-A atom, E is a Group VI-A atom, X is a Group VII-A atom, and each R is individually selected from the group consisting of alkyl, aryl, vinyl, perfluoro alkyl, perfluoro aryl, silane, and carbamate groups.

31. (original) A single source precursor according to claim 30, said single source precursor being effective to yield a I-III-VI₂ ternary chalcopyrite material upon heating or pyrolysis of said single source precursor at a temperature less than about 500°C.

32. (original) A single source precursor according to claim 30, said single source precursor being effective to yield a ternary chalcopyrite material having a band gap of about 1.5 eV between a conduction band and a valence band thereof.

33. (original) A single source precursor according to claim 32, said ternary chalcopyrite material being CuInS₂.

34. (original) A single source precursor according to claim 30, said single source precursor being effective to yield a ternary chalcopyrite material having a band gap of about 2-2.4 eV between a conduction band and a valence band thereof.

35. (original) A single source precursor according to claim 34, said ternary chalcopyrite material being CuGaS₂.

New
Claim
35
36. (original) A single source precursor according to claim 30, said single source precursor being effective to yield a ternary chalcopyrite material having a band gap of 1.5-2 eV between a conduction band and a valence band thereof, said ternary chalcopyrite material being Cu(In:Ga)(S:Se)₂.

New
Claim
36
37. (currently amended) A single source precursor ~~according to claim 1, having three E-R groups for the deposition of ternary chalcopyrite materials,~~ said single source precursor having the empirical formula [{L}_nM'(ER)_x(X)_y(R)_zM''], wherein x is 3, x+y+z=4, n is greater than or equal to 1, L is a Lewis base that is coordinated to M' via a dative bond, M' is a Group I-B atom,

M" is a Group III-A atom, E is a Group VI-A atom, X is a Group VII-A atom, and each R is individually selected from the group consisting of alkyl, aryl, vinyl, perfluoro alkyl, perfluoro aryl, silane, and carbamato groups, said single source precursor excluding

[{P(C₆H₅)₃}₂Cu(S-C₂H₅)₂In(S-C₂H₅)₂],
[{P(C₆H₅)₃}₂Cu(Se-C₂H₅)₂In(Se-C₂H₅)₂],
[{P(C₆H₅)₃}₂Cu(S(i-C₄H₉))₂In(S(i-C₄H₉))₂],
[{P(C₆H₅)₃}₂Cu(Se(i-C₄H₉))₂In(Se(i-C₄H₉))₂],
[{P(C₆H₅)₃}₂Ag(Cl)(SC{O}CH₃)In(SC{O}CH₃)₂],
[{P(C₆H₅)₃}₂Ag(Cl)(SC{O}C₆H₅)In(SC{O}C₆H₅)₂],
[{P(C₆H₅)₃}₂Ag(SC{O}CH₃)₂In(SC{O}CH₃)₂],
[{P(C₆H₅)₃}₂Ag(SC{O}C₆H₅)₂In(SC{O}C₆H₅)₂],
[{P(C₆H₅)₃}₂Cu(SC{O}C₆H₅)₂In(SC{O}C₆H₅)₂],
[{P(C₆H₅)₃}₂Cu(SC{O}C₆H₅)₂Ga(SC{O}C₆H₅)₂],
[{P(C₆H₅)₃}₂Ag(SC{O}C₆H₅)₂Ga(SC{O}C₆H₅)₂], and
[{P(C₆H₅)₃}₂Ag(SC{O}CH₃)₂Ga(SC{O}CH₃)₂].

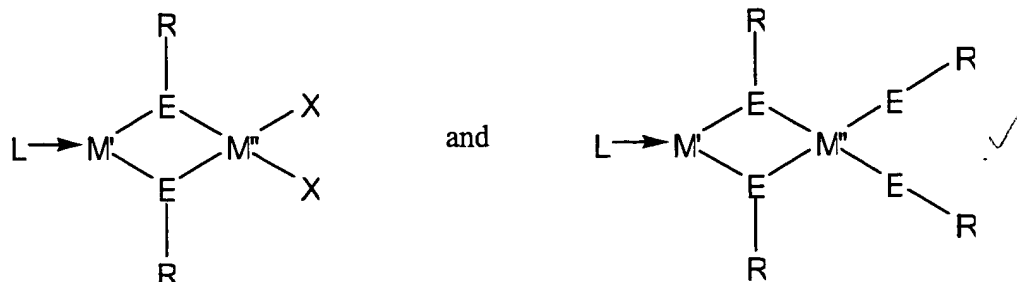
38. (original) A single source precursor for the deposition of ternary chalcopyrite materials, said single source precursor being a liquid at room temperature and being effective to yield a ternary chalcopyrite material upon heating or pyrolysis thereof.

39. (original) A single source precursor according to claim 38, said single source precursor being effective to yield a I-III-VI₂ ternary chalcopyrite material upon heating or pyrolysis of said single source precursor at a temperature less than about 500°C.

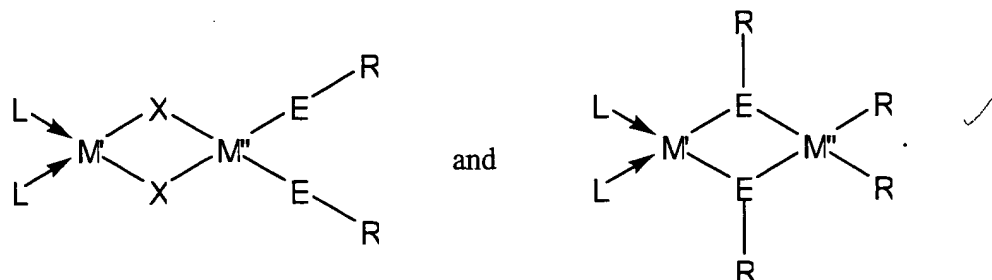
40. (currently amended) A method of depositing ternary chalcopyrite materials comprising the steps of:

a) providing a first single source precursor for said ternary chalcopyrite material, said first single source precursor having the empirical formula [{L}_nM'(ER)_x(X)_y(R)_zM"], wherein x is 1-4, x+y+z=4, n is greater than or equal to 1, L is a Lewis base that is coordinated to M' via a dative bond, M' is a Group I-B atom, M" is a Group III-A atom, E is a Group VI-A atom, X is a Group VII-A atom, and each R is individually selected from the group consisting of alkyl, aryl,

42. (original) A method according to claim 40, said single source precursor having a structural formula selected from the group consisting of

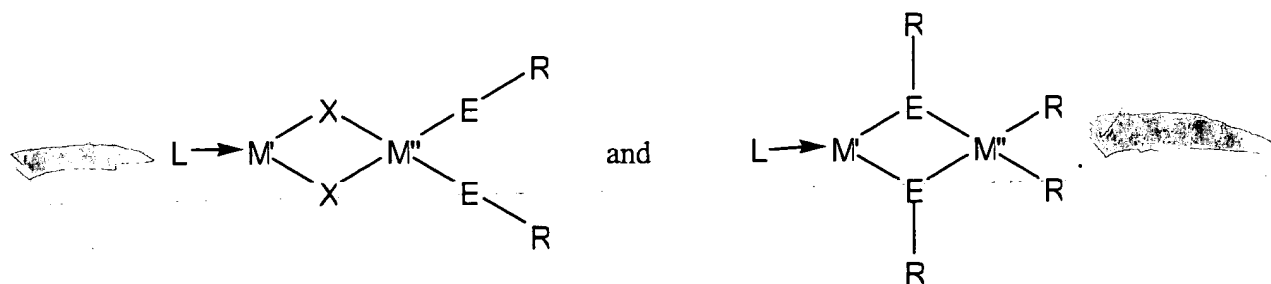


43. (original) A method according to claim 40, said single source precursor having a structural formula selected from the group consisting of



New
Claim
43

44. (original) A method according to claim 40, said single source precursor having a structural formula selected from the group consisting of



45. (original) A method according to claim 40, said single source precursor having three E-R groups.